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ABSTRACT

The first of information science is in something of a jumble, because there is no universally accepted definition of the field, much less an agreement on what the core information is or what curriculum should be followed. Information science teachers must decide what kind of graduate they are trying to turn out in order to be competitive with business and computer science graduates. The job market for information science graduates is potentially larger than the current one composed of libraries and information marketing companies. In order to be competitive in this larger job market, information science curriculum should be strengthened so that library science graduates know information technology and how to use it on an equal basis with computer and business graduates. An attempt should be made to attract more business and science students into the field of information science. (KKC)

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ON INFORMATION SCIENCE EDUCATION: A REBELLIOUS VIEW

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I was asked to give my views on information science education as one who has recently joined the educational ranks on a full-time basis. I might begin by agreeing with Peter Drucker, who once suggested the desirability of changing one's profession in about the middle of one's working years. Having just done so, I find it refreshing, but humbling. The difference between being an adjunct faculty member and a full-time one is very large. It is like the difference between being a systems development consultant who suggests how a project ought to be done and a line manager who has the responsibility for doing it.

It will come as no surprise to most of you that I find the field of information science education in something of a jumble. We have no universally accepted definition of the field, much less an agreement on what curriculum to follow. Personally, I can subscribe to the definition used in the ASIS membership brochure:

> Information science is concerned with the generation, collection, organization, interpretation, storage, retrieval, dissemination, transformation, and use of information. As a discipline, it seeks to create and structure a body of scientific, technological, and systems knowledge related to the transfer of information...

The trouble is that while two physicists recognize their common professional backgrounds because, to some extent, they know the same things, we in the information profession know so many diverse things, with so little in common, that we can't seem to agree on what is the core information in the field. The same happened in computer science. Some people even deny the existence of such a science because of the lack of this common base of knowledge and a clear relationship between theory and practice.

Nonetheless, there are people who call themselves information scientists, there are students of information science, and there are professors of information science. Within this set of people we have one group that tends to equate information science with documentation. To them, information science is a branch of library science generally practiced in special libraries and in information analysis and dissemination centers. The formal academic world apparently agrees, because most information science departments or curricula are in library schools. Of course, many academics no longer hold this view, but organizational inertia maintains the relationship.

Another group, of which I am a member, sees information science as a field so broad that it makes library science only a small part of its domain. At one meeting I attended which attempted to define information science, a sarcastic remark was made to the effect that even some accountants considered themselves to be in information science. I later challenged the group to whom this was said to give a definition of the science that logically excluded the accountant, but got no reply. In fact, accountants are responsible for designing systems that generate, collect, organize, interpret, store, retrieve, disseminate, transform, and use the information which to computies is their life blood. Equating the accountant with the bookkeeper is like equating the reference librarian with the page -- a getter and shelver of books. Including the accountant in our profession, however, means we agree to deal with information that is not, never was, and may never be in book form, and this offends many information scientists. But, the non-book information people are in the majority. They are managing companies, auditing accounts, selling airplane tickets, keeping corporate inventories, analyzing air traffic control systems, and doing all sorts of interesting information things.

The field is ill-defined enough that it is not polarized around these two views of information science as either documentation or a universal science encompassing virtually all of human communication and the technology that makes it possible. There are other views, but I present these as two common extremes to illustrate the problem of analyzing information science education today.

One of my first duties at Drexel was to look at the information science curriculum and make any indicated suggestions for change. At that time, I talked with people at some nearby schools to see what they were doing, and read a few catalogs of other schools. Practically, in terms of curricula, and if we stick to schools officially describing themselves as offering information science, there is not as much diversity as the extremes would seem to indicate, but I think there may be a hidden problem.

Generally, the curricula follow the library science core, then add some courses on computers, systems analysis, and microphotography. The "products" of these curricula are librarians with some technical knowledge. Most of them go to work in special libraries, or on the systems staff of a general library. If they stay with general librarianship, they are probably welcome additions to the staff, because they can at least talk to the salesperson from the on-line systems company.

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Sometimes, information science is combined with computer science, as it is at Georgia Tech. At Lehigh, it is in the Philosophy Department, and the emphasis is on linguistics, making that combination not so strange as it sounds at first. At the University of Pennsylvania, what I would call information science courses seem to be scattered all through the university. To some people, this is exactly the way it should be -- they see information science as essentially interdisciplinary and prefer to see the core information taught by the specialty departments. Points of concentration at Penn are in the Moore School of Electrical Engineering and the Wharton School, the business and finance school. But, in both cases, courses designated information science are supporting a curriculum whose main thrust is elsewhere.

Let us consider, for a moment, the interrelationship among computer science, information science, and business administration. I would like to do so from the practitioner's side. Oversimplifying for the purpose of making my point, computer scientists tend not to be interested in complete information systems, especially user problems. They want to design and implement algorithms, the tougher the better. Business school graduates have many of these skills but have a tendency to concentrate on the management aspects, and are not interested in pursuing a career of performing at a technical level. Librarians tends to show no interest in information systems until someone offers to put the information on microfilm, if not in a book.

In working on automated systems, whether for business management or libraries, there is a need for people who know how to do a systems analysis, who know enough about computer programming that they can produce general specifications for programs and understand the problems of a programmer and his need for detail, and who understand the data. "Understanding data" means to know how it originates, how it flows, how errors creep in, how to detect and correct errors, how long it takes to move information, what delays its movement, and how to use it to solve the problems of the organization that owns it. This is different from "understanding machinery" which involves knowing how to do such things as program computers, modulate signals, or reproduce a visual image. McLuhan wrote of "understanding media" where the main emphasis was on a kind of statistical effect of the transmission medium, not on individual message transmissions.

Our new breed of information scientists must have command of all three: data, media, and machinery. To my knowledge, there is no program of study that is currently training people well in all three. We, in information science, are the closest, but are hampered by our traditional insistence on library orientation and our general lack of interest in data in non-book or non-page form.

The new positions I am describing will be in business and government and will involve systems analysis, design, implementation, and operation of information systems without regard to the form of data or its ultimate use -- as much interest, then, in a counting data as in library acquisition (in fact, in the corporate grand scheme, library acquisition doesn't excite much interest), as much in the searching of budget files as of bibliographic files, or of networks for corporate personnel data as for library catalogs.

While I am convinced, from my own observations and from conversations with others, that this third world kind of job exists and its numbers are growing, employers, themselves, don't always know what to call the positions. They certainly aren't using the title, Information Scientist, except for libraries or information centers, and they do not seek library school graduates to fill non-library information positions. In fact, employers may shun library school graduates as having an irrelevant education. Although neither computer science nor business administration is providing the ideal background for these positions, their graduates do get some rigorous training which many library school-trained information scientists do not get. This may cause a problem for them in competing with others. For example, all computer science graduates know how to program. Some business schools (e.g., Wharton) require, as a condition of enrollment, either passing a test on programming or taking a non-credit course. Both these disciplines expect students to use the computer routinely in their studies. Library schools are still giving credit for an optional introductory course in programming.

I said earlier that there may be a hidden problem in our current information science curriculum. That problem may materialize when our students compete in non-library environments with people from other fields, especially computer science, industrial engineering and business administration. To those with the "documentation" view of information science, there is no problem because they don't see it as their mission to prepare students for this competition. I am one who does see a problem; therefore, I worry a bit. Since information science as a formal field of study is so new, we have few examples of leaders in the profession arising from our own academic ranks. Today, most of the leaders in the field come either from library science or from seemingly unrelated fields, often one of the "hard" sciences. Among ASIS members, chemistry is second only to library science as the academic major for members.

What, exactly, do I see wrong? To simplify, it is a lack of rigor. We do teach computer programming, but the courses are not very intense (an admitted generalization). We teach systems analysis without a requirement for the tools necessary to understand it: statistics, computers, and communication technology. Without a solid background in technology, a systems analyst, who is almost invariably also a systems

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designer, cannot know the characteristics of the equipment he is considering for his systems. Willingness to generalize on the basis of meagre samples bearing an unknown relationship to the population from which they were taken has always plagued information science. We are now moving into an era of communication-based information systems, but few of our students come to know this technology well enough to make system-analytic decisions. These are examples only. The key is that we tend to excuse the library-information science student from knowing the technology he is to deal with, and in doing so we may deprive him of the skills needed to compete in the job market.

Can anything be done? Is it too late? Certainly, something can be done, and it is not yet too late. We do not even need any radical surgery, in my opinion. What we need first, as usual, is to recognize the problem. Information science teachers must decide not the definition of the field (that, I believe, is a life-long problem) but what kind of graduate they are trying to turn out. If we take the broader view, then we should also face up to the fact that other disciplines are preparing their students for the same general field. Most of us recognize information science as interdisciplinary. We know that we do not necessarily have to put all the new subject material to be covered in our own departments, that it is available elsewhere on the campus. We can begin to recruit more people with a science background. We can set certain minimum requirements for a student majoring in information science, as a protection to him in his career. This all can be done gradually, without trauma.

In summary, my assessment of the situation is this: (1) We pay lip service to information science as a broadly based, interdisciplinary science but we do not really train our students to practice such a profession. We shy away from the hard core technology courses which are essential to an understanding of the field and to the design of systems.

(2) There is a market for information scientists in the sense of people who know about information technology and content. The job market is potentially larger than the current one composed of libraries and information marketing companies. There are other professions which can train people for these jobs, but they are not aiming at exactly that, today. The information science curriculum of a library school could do it, that is, could turn out graduates who can compete for these jobs with business and computer science graduates. In order to be competitive, however we need to:

a. Strengthen the curriculum, so library science graduates know information technology and how to use it, on an equal basis with computer and business graduates. They don't need to know as much about programming as the computer scientist or about budgeting as the MBA, but they should be comfortable with both.

b. Attract more science and business students into information science, or find a way to make up for basic deficiencies (e.g., elementary mathematics or computer programming) in the average student.

(3) The employers do not know who we are and do not think of their job openings in terms of information scientists. This is a challenge to the more public relations oriented among us.

Finally, I would like to paraphrase an earlier statement of mine. Information science is a universal science, encompassing virtually all of human communication and its enabling technology. That we have tended to concentrate until now on communication about books is increasing, to the credit of library science, but irrelevant. Our field of interest for the future is unlimited. It is certainly one of the most exciting fields to be in and we owe it to ourselves and our students to prepare them for tomorrow's world, not yesterday's.

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shows that this learning experience to have been most important in helping individuals adjust to the work situation and manage well.

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